Abstracts of the physico-chemical literature in Japan

ABSTRACTS OF THE PHYSICO-CHEMICAL LITERATURE IN JAPAN

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1—GENERAL CHEMISTRY

High temperature magnetization of the ferrite. T. Takei, I. Yasuda and S. Ishihara. *J. Electrochem. Assoc. Japan*, **59**, 568—571 (1939).—Studies have been made on the high temp. magnetization of $CuO \cdot Fe_2O_3$ and $CoO \cdot Fe_2O_3$ by obtaining their magnetization curves, and the mech. of the high temp. magnetization has been made clear. In the magnetic substances which are highly susceptible to high temp. magnetization, it may be expected that the formation of super-lattice is quite noticeable during the heat treatment. Also it seems that the high temp. magnetization tends to accelerate the half turn of the elemental magnets.

Authors.

Measurement of true density of graphitised carbon. I. N. Kameyama and M. Takei. *J. Soc. Chem. Ind. Japan*. **42**, **244B**, (1939).—This series of investigations was carried out in connection with researches on the method of making the commutator brush of graphitised carbon, in order to select the best method for the detn. of graphitisation degree of carbon. The best and convenient method for the detn. of the density of powd. of graphitised carbons is the pyknometer method, using CCl_4 or C_6H_6. The authors give various causes of errors in the detns., such as evaporation of liq. during weighing, deviation of temp., insufficiency of expulsion of occluded or absorbed gases, etc., and the care to be taken to avoid these errors is discussed. A spec. care is taken for the excln. of absorbed or occluded gases from the sample of carbon. For example a spec. arrangement was made in which the sample in the pyknometer was completely evacuated by means of a mercury vapour diffusion pump, and then the liq. was filled in the pyknometer in the complete absence of contact of carbon and air; and the results obtained were compared with those of expts. in which the gases were expelled by boiling the liq. either under the atomspheric press. or under the reduced press. They agreed well showing that the latter method of excln. of the absorbed or occluded gases from carbon powd. is sufficiently effective for the purpose of measuring the density.

Authors.

On the Alkali-cellulose "Pseudo-Na-Cell II." H. Sobue. *Bull. Tokyo Univ. Eng.*, 8, 381—386 (1939).—When the natural cellulose is soaked in the caustic soda soln. of various concns. at room temp., Na-Cell I is formed in the range of 10—20% NaOH and Pseudo Na-Cell II is formed over 22% NaOH (C. Trogus u K. Hess *Z. Elektrochem.* 42, 704 (1936)). According to C. Trogus and K. Hess, Na-Cell II is formed by the steeping of cellulose in 25% NaOH soln. at 60—100°C. According to H. Sobue, H. Kiessig and K. Hess (*Z. physik. Chem.* **B 43**, 309 (1939)) Na-Cell V is formed by the soaking of cellulose in 17—25% NaOH soln. at 0°—15°C. It is possible that Na-Cell II is distinguished from Na-Cell V by the characteristic interferences A_1 and I_1 in the X-ray diagram. Pseudo Na-Cell II does not

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give a good equatorial interference in the X-ray diagram, but the interference I_1 of Pseudo Na-Cell II is considerably sharp. The lattice consts. of I_1 are as follows:

Na-Cell II; $d(I_1)$ 7.64
Na-Cell V; $d(I_1)$ 7.94
Pseudo Na-Cell II; $d(I_1)$ 7.7 7.85

It is clear, therefore, that Pseudo Na-Cell II is the mixed boundary product of Na-Cell II and Na-Cell V brought about by the estimation of lattice const. of I_1 interference.

The mechanism of combustion of hydrocarbons and knocking in the gasoline engines. N. Isogai. *The Exptl. Report of the Imp. Naval Fuel Depot*, **135**, 9—96. (1940).—From the study of the phys. and chem. properties of vibrations of moving and steady flames, the author elucidates the combustion mech. of fuels and of knocking in the gasoline engines. (1) In the combustion in tubes, the long column septd. by the flame generally becomes a vibrating column. If the vibration of a short column becomes the harmonics of the vibration of the long column, the vibration is replaced by the harmonics. In this case the velocity of flame propagation becomes rapid. (2) The vibration occurring in a steady flame is essentially the same as the above. (3) The vibration produces active oxygen in the combustible mixts., and this active oxygen accelerates the combustion and brings about an abnormal combustion (detonation). (4) This abnormal combustion is the cause of knocking in the gasoline engines. (5) When the air contg. very small part of tetraethyl lead is passed to the ozonizer, the quantity of ozone produced becomes less and less in inverse proportion to the added tetraethyl lead. Antiknocking agent is the substance that prevents the producing of the active oxygen. Author.

Polymerisation of tung oil. III. Molecular weight of tung oil and its polymerides. M. Tatimori. *Bull. C. S. J.*, **15**, **12**, 474—480 (1940).—The mol. wts. of polymerised tung oils were measured in the soln. of benzene, camphor, nitrobenzene, bromoform, ethylenebromide by the cryoscopic method. By the camphor method a reasonable mol. wt. was obtained. In benzene the mol. wt. decrs. rapidly with the incrg. concn. In nitrobenzene, ethylenebromide, and bromoform, the mol. wt. behaves as linear function of concn. and the rate of decr. in mol. wt. with incrg. concn. is not so notable as in benzene. On the contrary, in cyclohexan the mol. wt. incrs. with the incrg. concn. and reasonable values are obtained by extrapolation. The abnormality in benzene may be considered as due to the solvation action. Author.

2—ATOMIC STRUCTURE, RADIOCHEMISTRY AND PHOTOCHEMISTRY

Radiations from radioactive ^{65}Zn. Y. Watase, J. Itoh and E. Takeda. *Proc. Phys.-Math. Soc. Japan*, **III**, **22**, 90—105 (1940).—Long period activity of ^{65}Zn was obtained by deuteron bombardment of brass. Radiations from it were investigated by cloud chamber and by counters, and the following results were obtained. ^{65}Zn decays by K-electron capture as well as by positron emission to ^{65}Cu, the probability of the former being about 80 times larger than the latter. The max. energy of positrons was 0.47 mev. Intense gamma-rays whose energies are 1.0, 0.65 and 0.45 mev resp., accompany to the K-electron capture. Primary electrons of continuous spectrum as well as internal conversion electrons were not found. By the coincidence measurements of counters, positrongamma, K-X-ray-gamma and gamma-gamma coincidences were obsd., and tentative

level scheme is discussed. Authors.

Radioactivity of ^{65}Zn. J. Itoh and Y. Watase. *Proc. Phys.-Math. Soc. Japan*, III. 22, 784—785 (1940).—In regard to the mode of disintegration of the radioactive zinc isotope of ^{65}Zn, the relative decay of positron, X-ray and gamma-ray, was measured in the lapse of several months to test whether or not these radiations were emitted from a single element. The absorption curves of radiations emitted from ^{65}Zn by paper, aluminium and copper obtained on March 24 and July 30, 1940, are quite similar to each other and also the relative intensities of positron, X-ray and gamma-ray are equal to each other for both data on Nov. 1939 and on March or July 1940. These exptl. results indicate that positron, X-ray and gamma-ray decay with the same decay const. In order to explain these facts the level scheme and mode of disintegration previously proposed should be assumed although these facts are discrepant from the theory concerned.

J. C. L.

On the reflection of slow neutron by crystals. M. Kimura and J. Akutu. *Sc. P.*, 38, 63—66 (1940).—M. D. Whitaker and H. G. Beyer found a marked dependence of slow neutron scattering cross-section upon the crystalline state of the scatterer. The authors measured the cross-section for many crystals of various grain sizes by the method of back scattering. In the case of crystallized quartz, topaz, and calcite, a decrease of scattering is observed as the grain size becomes larger than a certain value, while in the case of sulphur, pyrite, and silicon the scattering is independent of the grain size. It is obvious that these phenomena are connected with the interference of neutron waves within the crystal lattice. In the case of X-ray, let the amplitude of the reflected wave of neutron on a certain net plane of the lattice be represented by q and the number of net planes making a coherent reflection of wave in a block of these crystal bodies which consist of mosaic block structures by m, then $\tanh mq/mq$ will be a measure of decreasing of reflection. This calcn. proves to be in agreement with the exptl. value. J. C. L.

On the scattering of slow neutrons by some elements. M. Kimura. *Proc. Phys.-Math. Soc. Japan*, III, 22, 391—397 (1940).—The scattering cross sections of slow neutrons ("C" and "D" neutrons) were measured by the method of back scattering for several elements having large "C" neutron absorption cross section. The marked non-additivity in the scattering cross sections between Hg, HgS and S which was reported in a previous paper was found to be in error. Both mercury and its compds. have a large "C" neutron scattering cross section as compared with the "D" neutron cross section. The scattering cross sections for silver and iodine were found to be independent of the neutron energy. Author.

On the resonance capture of slow neutrons and emission of gamma-rays. II. I. Nonaka. *Proc. Phys.-Math. Soc. Japan*, III, 22, 551—560 (1940).—The method of investigating the resonance neutron groups of any nucleus which is not made radioactive by neutron capture in the use of the gamma-rays emitted in the capture process itself was extended to Cl, Co, Ag and Ba. The gamma-ray intensity was mesaured as a function of thickness of paraffin layer interposed between a D+D neutron source and a detector. As the intensity of the gamma-rays emitted from these nuclei was very small except in the case of Ag, no such distinct results were obtained as in the case of Cd or Hg reported in the previous paper. But, from analysis of the gamma-ray intensity curves, it can be shown that Cl has not any distinct resonance groups, Co has a group of about 10^1—10^2 e. V. in energy, and Ba has a group of very high energy (perhaps of the order of 10^3 e. V.). The result for Ag is in qualitative agreement with that obtained by the ordinary method of ß-ray activity. In

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addition, the relative values of gamma-ray quanta emitted per capture of a thermal neutron were obtained to be 0.64, 0.74, 1.00 and 0.82 for Cl, Ag, Cd and Hg resp. These results are compared with those of other investigators. Author.

Analysis of experimental data for ß-disintegration. J. Itoh. *Proc. Phys.-Math. Soc. Japan*, **III**, 22, 531—550 (1940). The exptl. data concerning ß-ray radioactivity are analysed. In part I, mass differences of pairs of isobars, the Sargent relation and possible selection rule for ß-transition are discussed for light elements. Mass differences are analysed in connection with the formula given by Wigner and Barkas. From the Sargent diagram, essential agreement with the Fermi theory is deduced. Only the transitions between the pairs of isobars belonging to the same multiplet discussed by Wigner are allowed in strict meaning, while the transitions between isobars, which satisfy the selection rule for spin and parity and do not belong to the same multiplet, form a group, the decay period of which is about 40 times as large as that of the former. One more group of transitions which are about 10^{-4} times less probable as compared with the strictly allowed transitions, might be those between isobars which do not satisfy the selection rule for spin and parity. Spin O to spin O transition is completely forbidden. In part II, the Sargent diagram for all radioactive elements is discussed and also the Fermi theory seems to be well applicable to the interpretation of it. Allowed transition for natural radioactive elements belongs to the second group in part I and the forbidden transition to the third. From this it can be concluded that the heavy particle matrix elements for heavy ß-radio-active body will be of the same order as those for light elements, provided that the change in nuclear structure is similar in both cases. Author.

The photodisintegration of deuteron by radium gamma rays. M. Miwa. *Proc. Phys.-Math. Soc. Japan*, **III**, 22, 560—568 (1940).—The mean free path of Ra γ+D neutrons in paraffin was detd. by the scattering method and found to be 12.7 ± 2.0 mm. This value is definitely higher than that expected for 2.198 MeV line of RaC. Hence, it was concluded that there exists a RaC line or lines having effective energy of 2.6 MeV and more effective in liberating the neutron from deuteron than 2.198 MeV line. The yield and the angular distribution of photo-neutron were also found to be favourable to this conclusion. RaC gamma rays of 2.198 MeV are definitely less effective in disintegrating deuteron than expected for a virtual ^1S level. This is in good agreement with the obsn. on the angular distribution of RdTh γ+D neutron, but is contrary to the evidences obtained with thermal neutrons.

J. C. L.

Radiative detachment and attachment of negative oxygen ion. T. Yamanouchi. *Proc. Phys.-Math. Soc. Japan*, **III**, 22, 569—578 (1940).—It has been shown both theoretically and exptl. that certain atoms can exist stably in negatively charged states, and the electron affinity is great for the atoms which have nearly closed outer shells. Oxygen atom, lacking two 2p electrons to form a closed shell, has the affinity of about 2.2 e.V. This ion, being produced by various radiative and collision processes in the upper atm., will play an important part in producing and removing free electrons in the ionosphere. Of course, the abundance of the negative ion may be far inferior to that of neutral oxygen atoms, but the probability of ionization of the latter is small owing to the weak intensity of solar radiation in far ultra-violet region corresponding to the large ionization potential, while the light quanta are relatively abundant in the frequency region which is effective for detaching the negative ion. Also the detachment of O^- gives a chance for the production of the metastable ^1D and ^1S states of the neutral oxygen atoms, which is the origin of e th

auroral and night-sky light. The corresponding probability of production of these states by radiative recombination of the positive O^+ ion was found very small. So it would be of attachment processes of the neg. oxygen ion by accurate quantum mech. treatment. This is attempted here as one of the series of investigations concerning the probabilities of elementary processes that are taking place in the upper atm. J. C. L.

Absorption spectra of co-ordination compounds. IV. Ethylenediamine cobaltic complexes. H. Kuroya and R. Tsuchida. *Bull. C. S. J.*, **15**, 427—439 (1940).—1. Absorption spectra of a number of ethylenediamine cobaltic complex salts are obsd. Generally speaking, their absorption bands, especially the second, are more hypsochromic than those of the corresponding ammine salts. 2. The results prove that the authors' hypothesis on the absorption spectra holds good for the ethylenediamine complex salts. 3. Examples of the third absorption bands are found in the diethylenediamine cobaltic complexes of known configurations. 4. A new method of separating $[Co\ en_3]^{+}$ and $[Co\ en_2Cl_2^{(1)}_{(6)}]$ is devised. J. C. L.

Absorption spectra of metal complex salts of 2,2'-dipyridyl. K. Yamasaki. *Bull. C. S. J.*, **15**, 461—465 (1940).—Absorption spectra of the following complex salts were obsd. in aqu. and alcoholic soln.: I $[Fe(Dip)_3]Cl_3$, II $[Fe(Dip)_2(CN)_2]$, III $[Fe(Dip)(CN)_4]K_2$, IV $[Fe(CN)_6]K_4$, V $[Fe(Dip)_3]Cl_3$. They showed the following values of λ max. in mμ and log ε max. (aqu. soln. unless otherwise stated):

I: 520(3.85), 352(3.79), 298+289(4.78), 246(4.40).
II: 570(3.78), 372(3.79), 300+291(4.68), 247(4.38) (in alc.).
III: 480(3.37), 342(3.56), 296(4.38).
IV: — 330(2.3)* —
V: 620(2.25), 360(3.2)*, 300(4.58).

(* means break in absorption curve)

The ε-value of the absorption band in the region 295mμ which is assigned to the co-ordinated dipyridyl mols. is very nearly proportional to the number of dipyridyl mol. in the complex salts. Author.

On the absorption spectra of some substituted nitrosobenzenes and the resonance effect of the substituent. Y. Tsuzuki, T. Uemura and N. Hirasawa. *J. Chem. Soc. Japan*, **61**, 1063—1066 (1940). The light absorption of nitrosobenzene is supposed to have its origin in the resonance between the ordinary and the quinonoid forms. Burawoy (*J. Chem. Soc.*, 1177 (1939)) has observed the absorption spectra of some substituted nitrosobenzenes and found a remarkable bathochromic effect of the p-substituted $-OCH_3$ and $-N(CH_3)_2$ radicals. These radicals have been greatly influenced by the resonance phenomena and have stabilized the excited quinonoid structure by a mutual action of NO-group. The authors studied the influence of CH_3-group which showed only a very weak effect. And the results obtained are as follows:

Nitrosobenzene λ_{max} 2820 ε_{max} 7200
o-Nitrosobenzene λ_{max} 2860 ε_{max} 6250
m-Nitrosobenzene λ_{max} 2820 ε_{max} 5700
p-Nitrosobenzene λ_{max} 3140 ε_{max} 9100

As CH_3-radical has no lone electron pair, it has only little resonance effect. Its inductive effect makes the substituted nitrosobenzenes bathochromic. It is electron-repelling, and has the same tendency as $-OCH_3$ and $-N(CH_3)_2$. Thus, the p-substitution gives the greatest effect, the o-substitution a moderate effect, and the m-substitution almost none. This small effect of the o-substitution is probably due to a steric effect. Hodgson (*J. Chem. Soc.*, 1807 (1939)) has recently studied o-halogeno-nitrosobenzenes, and given λ_{max} 3116 and ε_{max} 1750 to the o-halogeno-nitrosobenzenes, and given λ_{max} 3116 and ε_{max} 1750 to the nitrosobenzene. According to his results, the o-halogeno-substitution has a hypsochromic influence, and the halogens act as an electron-attracting agents. But the authors' data showed that the o-halogeno-

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substitution gives a bathochromic effect and the resonance is dominating. The conclusions are also confirmed by some other expts., such as the orientation of substitution in a benzene ring, and the interatomic distance of carbon and halogen. Authors.

Studies on the metallic complexes co-ordinating the hydroxy-compounds. I. Effect of alkali on the polyhydric alcohols or the hydroxy-acids in aqueous solution. M. Kubota. *J. Chem. Soc. Japan*, **61**, 1176—1181 (1940).—It was obsd. that the light absorption of polyvalent alcohols increases with the concn. of alkali in soln. This fact has been explained as the elelctrostatic effect of alkali metal ion upon the hydroxy groups of polyvalent alcohols. In high alkali concn., complex-oompds. of those central ions of alkali metals and co-ordinating polyvalent alcohols are formed. In the case of hydroxy acids, light absorption is weakend by incrg. alkali concn. till the quantity of alkali becomes equiv. to carboxyl group. This is due to the dissocn. of carboxylic acid. In higher alkali concn., light absorption in the part of the longer wave length increases. **II. Formation and absorption spectra of polyhydric alcohol-copper-alkali complex solution.** *ibid.*, **61**, 1182—118 (1940).—Conditions of forming glycerin or mannite-copper-NaOH system complex solns. were well investigated and also absorption spectra of these complexes were measured. From these exptl. results, the structure of complex radicals in slon. is discussed. **III. Absorption spectra of tartaric acid-copper-alkali complex solutions.** *ibid.*, **61**, 1256—1260 (1940).—It was obsd. that, till the molar quantity of NaOH in the soln. becomes equiv. to the total of tartaric acid and $CuSO_4$, the second absorption band of complexes moves tot he part of higher frequency and at the same time the special absorption band moves to the part of lower frequency with incrg. NaOH. In higher concn. of NaOH, both absorption bands move to the part of higher frequency and the stability of complex compds. increases. **IV. Optical activity of tartaric acid-copper-alkali complex solutions and structure of the complex radicals.** *ibid.*, **61**, 1261—1268 (1940).—When the mol. ratio of *d*-tartaric acid and $CuSO_4$ in solns. is 1:2, 1:1, 2:1, 3:1, or 5:1, the curves of optical rotation show max., min. and again max. with incrg. NaOH. Esp. when the mol. ratio of *d*-tartaric acid and $CuSO_4$ are 1:2, or 1:1, the optical rotation shows laevo-rotatory value at the min. point of the curve. In the case of *l*-tartaric acid, the results are symmetrical of those of *d*-tartaric acid. The author thinks that the course of these abnormal changes of optical rotation is due to the formation of complex radicals which has structually a specially fixed rotatory power. The rotatory power is laevo or dextro as the rotation of the co-ordinated tartaric acid is dextro or laevo, and the value of rotatory power due to the special structure of complex radicals is greater than that of the optical active mols. From these results of optical rotation and absorption spectra, the structures of complex radicals in soln. are deduced. Author.

3—ELECTROCHEMISTRY AND THERMOCHEMISTRY

On the electrical resistance of liquid sodium. A. Harasima. *Proc. Phys.-Math. Soc. Japan*, **III**, 22, 183—188 (1940).—The absolute value of electrical resistance of liq. sodium is calcd. on the basis of the electron theory of metallic conduction by using the model of Wall by which he calcd. the atomic distribution function of liq. sodium. The agreement between theoretical and exptl. values is fairly good. Further, the temp. coeff. of resistance is calcd. Finally, the values calcd. by using the author's own

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model are given. Author.

The electric resistance of graphite. T. Wada. *J. Electrochem. Assoc. Japan*, 8, 200—204 (1940).—The electric resistance and the bulk compressibility were measured on a few kinds of commercial flake and amorphous graphites for detg. their qualities. The results are as follows. (1) The powdered flake graphite of lower electric resistance has a higher bulk compressibility; that is, being more plastic and more completely flaky, when it is compressed, its grains come to closer face to face contact. Therefore this contact resistance of its grains is lower than that of other kinds of graphite. (2) The volatile matter and the moisture content of graphite varied its electric resistance in proportion of their amts. The volatile matter content gives greater influence on the electric resistance than the porosity formed under the compressed state of the powdered graphite. Author.

Behaviour of the foreign metal particles in the composite photocathode. S. Asao. *Proc. Phys.-Math. Soc. Japan*, III, 22, 448—486 (1940).—Part I. (1) When silver atoms are condensed at room temp. on the activated cathode Cs—Cs_2O, Ag-[Ag] made of about 70 mol. layers of Ag_2O, its photoemission increases linearly with the amt. of condensed silver at first and reaches a max. value at last. Sensitivity of several times as high as its original value is thus obtained by this method. The number of silver atoms needed for a max. sensitivity is comparable with that of Cs_2O mols. (2) When silver atoms are condensed at 100°C on the above cathode, its photo-emission increases linearly at first, but its thermionic emission decreases exponentially with the amt. of condensed silver. (3) When silver atoms are condensed at −180° on the above cathode, its photoemission decreases with the amt. of silver, however small it may be. (4) Cathode Cs-Cs_2O, Cs, Ag-[quartz] having no supporting metal, has a resistance 120Ω/cm² along the surface and contains such silver particles as seen in the photographic film under microscope. The film resistance has a metallic property and decreases to a half value when silver is condensed to a max. sensitivity. Part II. Thick photocathode Cs-Cs_2O, Cs-[Ag] not contg. reduced silver particles is compared with the cathode Cs-Cs_2O, Cs, Ag-[Ag] contg. them. The silver atoms condensed on the cathode increase the emission very strikingly. The semitransparent cathode Cs-Cs_2O, Cs-[quartz] with condensed silver atoms has still a property of semiconductor. Spectral reflection of the film Cs-Cs_2O, Cs-[quartz] with condensed silver resembles that of the silver film of the same thickness. Thermionic emission from the cathodes Cs-Cs_2O, Cs, Ag-[Ag] made of intermediate layers of varying thickness, some of which are sensitised by silver atoms, are described. Their work functions are much the same, but the value of A decreases whenever silver atoms are added. From the expts. described so far, the following points are discussed: (1) construction of the composite cathode; (2) selective emission humps appearing in the spectral sensitivity curve; (3) relation between foreign metal particles and thermionic emission. Author.

4—COLLOID CHEMISTRY AND SURFACE CHEMISTRY

A study of amorphous films by electron diffraction. I and II. S. Yamaguchi. *Bull. Inst. Phys. Chem. Research*, 19, 1210—1212 (1940).—The study of solns. is generally difficult, since it is necessary to maintain the electron diffraction camera in a state of high vacuum. However, the desiccation of hygroscopic substances, such as $ZnCl_2$

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and $ZnBr_2$, does not take place rapidly even at high vacua of the order of 10^{-4}—10^{-5}mm. Hg, and as a matter of fact, the thin films of such substances give diffraction halos and rings. The purpose of this study is the detn. of the inner structure of amorphous films of highly concd. solns. through the diffraction patterns obtained. A platinum net of about 0.5 mm. sq. was previously washed with bichromic acid. After immersing it in the aqu. solns. of $ZnCl_2$ and $ZnBr_2$, the thin films were successfully obtained. The films thus obtained were hygroscopic and had a remarkable surface effect so much so that they were not easily broken and served satisfactorily for the electron diffraction study. Author.

A study of amorphous films by electron diffraction. III. S. Yamaguchi. *Sc. P.*, **38**, 100—105 (1940).—1. Through the results of the present study, it is proved that a colloidal substance of a definite structure exists just before the film consisting of a satd. aqu. $ZnBr_2$ soln. solidifies into that of $ZnBr_2 \cdot 2H_2O$ crystals. In the case of $ZnCl_2$, just on the verge of crystallization of $ZnCl_2$ from its soln., there is an analogous stage, the structure of the substance being entirely similar to the former. 2. In this study the author tried to express more concretely the inner structure of amorphous films existing on the blink of crystallization of $ZnCl_2$ and $ZnBr_2 \cdot 2H_2O$, by treating quantitatively the diffraction halos and rings obtained in the preceding expts. 3. A conclusion to the problem of the existence or non-existence of the compd. $ZnCl_2 \cdot 2H_2O$, is made possible from the present work. J. C. I.

On the electron diffraction "N Pattern" from a thin $KHCO_3$ film produced by chemical reaction. S. Yamaguchi. *Sc. P.*, **38**, 142—145 (1940).—A method of preparing two-dimensional film of $KHCO_3$ was discovered by the present author. Thin film of water was first prepd. by immersing a platinum wire-gauze in water and then withdrawing it. Upon bringing such a film into contact with a piece of potassium, a chem. reaction takes place, giving a film of the reaction product $KHCO_3$ adhering the gauze and suitable for electron diffraction. The potassium bicarbonate has already been studied by X-rays and the data serve well for comparison here. Author.

The investigation of thin films of cellulose and its derivatives by electron diffraction. I. On the three halos. J. Kakinoki. *Proc. Phys-Math. Soc. Japan*, **22**, **12**, 1010—1016 (1940).—In the preliminary report, the three halos obtained from films of nitro-cellulose by electron diffraction were quantitatively interpreted. The outer halo was ascribed to the interatomic distances of the neighbouring C–C, C–O, O–O and N–O atoms, the middle halo to those of C–C, C–O, O–O and N–O intervened by one of C, O and N, and the inner halo to longer distances. If this conclusion is correct, these three halos should generally be obtained from films of other org. substances in amorphous state. In the present paper, this point is ascertained with films of native-, acetyl-, benzyl-, methyl- and nitro-cellulose, agar, gelatin and polystyrene: films of resogalz, polyethylene sebacate, "white" gutta percha, fibroin and keratin, reported by other investigators are used as reference. **II. On the crystalline patterns.** *ibid.*, **22**, **12**, 1017—1022 (1940).—There are obtained by electron diffraction the crystalline patterns of native-, acetyl-, benzyl-, methyl-, and nitro-cellulose, which are consistent with those obtained by X-rays. A brief account is described in each case. Especially in the case of native-cellulose a discussion is given concerning the alternatives of its crystal structure. The comparison of crystalline rings with amorphous three halos is also reported. Author.